UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/565,617	02/28/2007	Mathias Fink	2844/50018	2357

57726 7590 08/18/2009

MILLER, MATTHIAS & HULL
ONE NORTH FRANKLIN STREET
SUITE 2350
CHICAGO, IL 60606

EXAMINER	
RATCLIFFE, LUKE D	

ART UNIT	PAPER NUMBER
3662	

NOTIFICATION DATE	DELIVERY MODE
08/18/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

lrudaitis@MILLERMATTHIASHULL.COM

Office Action Summary	Application No.	Applicant(s)	
	10/565,617	FINK ET AL.	
	Examiner	Art Unit	
	LUKE D. RATCLIFFE	3662	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 April 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15,18-24,26 and 29-31* is/are rejected.

7)☒ Claim(s) *16 and 17* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *24 January 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-15, 18, 20, and 23, 24, 26-29, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Montaldo et al (Generation of very high pressure pulses with 1-bit time reversal in a solid waveguide) in view of Hiyama (WO20050103675) using US20070282543 for translation.

Referring to claims 1, 23, 27, and 28, Montaldo shows a sound-wave imaging method including at least one emission step during which a first array of transducers is caused to emit at least one ultrasound excitation wave presenting a certain central emission frequency fc and focused on at least one target point in a target medium and said excitation wave is caused to pass through a reverberant medium prior to reaching the target medium (page 2849 column 2-page 2850 column 2), the method being characterized in that during the emission step, a reverberant solid object is used as the reverberant medium, with each transducer of the first array being secured thereto, said reverberant solid object being adapted to give rise to multiple reflections of the excitation wave that passes therethrough and to cause an impulse wave of duration 1/fc entering into said solid object to lead to sound emission to the target medium taking place over a duration of not less than 10/fc (figure 1 7 transducers and metallic cylinder

and pages 2849-2850). However Montaldo does not show the use of this system in an echo imaging system designed to received echoes emitted by the target medium in response to the excitation waves and imaging the target medium based upon the echoes.

Hiyama shows a similar device that includes the use of a reverberant solid object to pass excitations waves from a transducer array into the target medium and to receive echoes emitted by the target medium in response to the excitation waves and imaging the target medium based upon the echoes (figure 1 Ref 23, 34 and paragraph 4). It would have been obvious to include the imaging based upon echoes of the target medium because this allows the device of Montaldo to image the target such as stones within the body to determine the position requiring high pressure pulses.

Referring to claims 2 and 24, Montaldo shows the emission step, the excitation wave s(t) is emitted towards a number K not less than 1 of predetermined target points k belonging to the target medium, by causing each transducer i of the first array to emit an emission signal (see claimed equation) where the signals elk(t) are predetermined individual emission signals adapted so that when the transducers i emit the signals eik(t), an impulse sound wave is generated at the target point k (page 2851-2853).

Referring to claim 3, Montaldo shows the signals eik(t) are encoded on a number of bits lying in the range 1 to 64 (page 2852).

Referring to claim 4, Montaldo shows the signals eik(t) are coded on 1 bit (page 2852).

Referring to claim 5, Montaldo shows the individual emission signals eik(t) are determined experimentally during a training step, prior to said emission step (page 2851-2852).

Referring to claim 6, Montaldo shows in which during the training step, an ultrasound impulse signal is caused to be emitted successively from each predetermined target point k, the signals rik(t) received by each of the transducers i of the first array from the emission of said ultrasound impulse signal are picked up, and the individual emission signals eik(t) are determined by time reversal of the received signals rik(t): eik(t) = rik(-t) (page 2851-2852).

Referring to claim 7, Montaldo shows the training step, a liquid medium different from the target medium is put into contact with the reverberant solid object, and said impulse signal is caused to be emitted from said liquid medium (page 2849-2850).

Referring to claim 8, Montaldo shows during the training step, for a predetermined target point k, an ultrasound impulse signal is caused to be emitted in succession from each of the transducers i of the first array, the signals rik(t) received at the target point k from the emission of said ultrasound impulse signals are picked up, and the individual emission signals eik(t) are determined by time reversal of the received signals rik(t): eik(t) = rik(-t) (page 2851-2852).

Referring to claim 9, Montaldo shows during the training step, a liquid medium different from the target medium is put into contact with the reverberant solid object, and the signals rik(t) are picked up in said liquid medium (page 2849-2850).

Referring to claim 10, Montaldo shows the liquid medium used during the training step essentially comprises water, and in which during the emission step, the target medium in which the excitation wave is focused comprises at least a portion of the body of a patient (page 2849).

Referring to claim 11, Montaldo shows the individual emission signals eik(t) are determined by calculation (page 2851-2853).

Referring to claim 12, Montaldo shows the reverberant solid object through which the excitation wave is caused to pass during the emission step is in contact with the target medium (page 2849 column 2).

Referring to claims 13, the combination of Montaldo and Hiyama shows a step of receiving echoes emitted by the target medium in response to the excitation wave, in order to image at least a portion of said target medium (paragraph 4 of Hiyama).

Referring to claims 14 and 26, Montaldo shows the excitation wave is emitted for a duration lying in the range 1/2fc to 10/fc (2850 column 2).

Referring to claim 15, Montaldo shows during the emission step, the excitation wave passes through at least one acoustically non-linear medium (-:2-) and presents an amplitude that is sufficient for waves that are harmonics of the central emission frequency to be generated in said acoustically non- linear medium; and during the reception step, echoes returned from the target medium are picked up at a receive frequency that is an integer multiple of the central emission frequency (inherent with the metal cylinder and figure 8 Ref a).

Referring to claim 18, Montaldo shows during the emission step, the target medium in which the excitation wave is focused comprises at least a portion of the body of a patient (2849).

Referring to claims 20 and 30, Montaldo shows during the emission step, an amplitude modulated excitation wave is emitted that is adapted to apply radiation pressure on the target medium to generate a low frequency shear wave (page 2852).

Claims 19 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Montaldo et al (Generation of very high pressure pulses with 1-bit time reversal in a solid waveguide) in view of Hiyama (WO20050103675) using US20070282543 for translation as applied to claims 1-15, 18, 20, 23-28, 29, and 30 above, and further in view of Borchardt (20020126577).

Referring to claims 19 and 29, Montaldo shows a sound-wave imaging method including at least one emission step during which a first array of transducers is caused to emit at least one ultrasound excitation wave presenting a certain central emission frequency fc and focused on at least one target point in a target medium and said excitation wave is caused to pass through a reverberant medium prior to reaching the target medium (page 2849 column 2-page 2850 column 2), the method being characterized in that during the emission step, a reverberant solid object is used as the reverberant medium, with each transducer of the first array being secured thereto, said reverberant solid object being adapted to give rise to multiple reflections of the excitation wave that passes therethrough and to cause an impulse wave of duration 1/fc

entering into said solid object to lead to sound emission to the target medium taking place over a duration of not less than 10/fc (figure 1 7 transducers and metallic cylinder and pages 2849-2850). However Montaldo does not show the use of this system in an echo imaging system designed to received echoes emitted by the target medium in response to the excitation waves and imaging the target medium based upon the echoes.

Hiyama shows a similar device that includes the use of a reverberant solid object to pass excitations waves from a transducer array into the target medium and to receive echoes emitted by the target medium in response to the excitation waves and imaging the target medium based upon the echoes (figure 1 Ref 23, 34 and paragraph 4). It would have been obvious to include the imaging based upon echoes of the target medium because this allows the device of Montaldo to image the target such as stones within the body to determine the position requiring high pressure pulses. However Montaldo does not show during the reception step, the echoes returning from the target zone are picked up by means of a second array of transducers secured to said reverberant solid object.

Borchardt shows a similar device that includes the echoes returning from the target zone are picked up by means of a second array of transducers secured to said reverberant solid object (paragraph 11). It would have been obvious to modify Montaldo to include the second array as shown by Borchardt because this allows for more simple simultaneous transmission and reception and this is a combination of prior art elements according to known methods to yield predictable results.

Claims 20, 21, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Montaldo et al (Generation of very high pressure pulses with 1-bit time reversal in a solid waveguide) in view of Hiyama (WO20050103675) using US20070282543 for translation as applied to claims 1-15, 18, 20, 23-28, 29, and 30 above, and further in view of Dubinsky (20040257912).

Referring to claims 20 and 30, Montaldo shows a sound-wave imaging method including at least one emission step during which a first array of transducers is caused to emit at least one ultrasound excitation wave presenting a certain central emission frequency fc and focused on at least one target point in a target medium and said excitation wave is caused to pass through a reverberant medium prior to reaching the target medium (page 2849 column 2-page 2850 column 2), the method being characterized in that during the emission step, a reverberant solid object is used as the reverberant medium, with each transducer of the first array being secured thereto, said reverberant solid object being adapted to give rise to multiple reflections of the excitation wave that passes therethrough and to cause an impulse wave of duration 1/fc entering into said solid object to lead to sound emission to the target medium taking place over a duration of not less than 10/fc (figure 1 7 transducers and metallic cylinder and pages 2849-2850). However Montaldo does not show the use of this system in an echo imaging system designed to received echoes emitted by the target medium in response to the excitation waves and imaging the target medium based upon the echoes.

Hiyama shows a similar device that includes the use of a reverberant solid object to pass excitations waves from a transducer array into the target medium and to receive echoes emitted by the target medium in response to the excitation waves and imaging the target medium based upon the echoes (figure 1 Ref 23, 34 and paragraph 4). It would have been obvious to include the imaging based upon echoes of the target medium because this allows the device of Montaldo to image the target such as stones within the body to determine the position requiring high pressure pulses. However Montaldo does not show during the emission step, an amplitude modulated excitation wave is emitted that is adapted to apply radiation pressure on the target medium to generate a low frequency shear wave.

Dubinsky shows a similar device that includes during the emission step, an amplitude modulated excitation wave is emitted that is adapted to apply radiation pressure on the target medium to generate a low frequency shear wave (paragraph 56). It would have been obvious to modify Montaldo to include the shear wave as shown by Dubinsky because this allows the system to move the target at the atomic level thus creating a better result and is a combination of prior art elements according to known methods to yield predictable results.

Referring to claim 21, Montaldo shows during the emission step, the target medium in which the excitation wave is focused comprises at least a portion of the body of a patient (2849).

Claims 22 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Montaldo et al (Generation of very high pressure pulses with 1-bit time

reversal in a solid waveguide) in view of Hiyama (WO20050103675) using US20070282543 for translation as applied to claims 1-15, 18, 20, 23-28, 29, and 30 above, and further in view of Romano (5207214).

Referring to claims 22 and 31, Montaldo shows a sound-wave imaging method including at least one emission step during which a first array of transducers is caused to emit at least one ultrasound excitation wave presenting a certain central emission frequency fc and focused on at least one target point in a target medium and said excitation wave is caused to pass through a reverberant medium prior to reaching the target medium (page 2849 column 2-page 2850 column 2), the method being characterized in that during the emission step, a reverberant solid object is used as the reverberant medium, with each transducer of the first array being secured thereto, said reverberant solid object being adapted to give rise to multiple reflections of the excitation wave that passes therethrough and to cause an impulse wave of duration 1/fc entering into said solid object to lead to sound emission to the target medium taking place over a duration of not less than 10/fc (figure 1 7 transducers and metallic cylinder and pages 2849-2850). However Montaldo does not show the use of this system in an echo imaging system designed to received echoes emitted by the target medium in response to the excitation waves and imaging the target medium based upon the echoes.

Hiyama shows a similar device that includes the use of a reverberant solid object to pass excitations waves from a transducer array into the target medium and to receive echoes emitted by the target medium in response to the excitation waves and

imaging the target medium based upon the echoes (figure 1 Ref 23, 34 and paragraph 4). It would have been obvious to include the imaging based upon echoes of the target medium because this allows the device of Montaldo to image the target such as stones within the body to determine the position requiring high pressure pulses. However Montaldo does not show during the emission step, an excitation wave is emitted that is adapted to heat the target medium locally.

Romano shows a similar device that includes during the emission step, an excitation wave is emitted that is adapted to heat the target medium locally (column 3 line 55-65). It would have been obvious to modify Montaldo to include the localized heating as shown by Romano because this aids in comfort of the patient and is a combination of prior art elements according to known methods to yield predictable results.

Allowable Subject Matter

Claims 16 and 17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

Applicant's arguments with respect to claims 1-31 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LUKE D. RATCLIFFE whose telephone number is (571)272-3110. The examiner can normally be reached on 10:00-5:00 M-Sun.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Tarcza can be reached on 571-272-6979. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

LDR

/Thomas H. Tarcza/
Supervisory Patent Examiner, Art Unit 3662